

CLAIMS

1. A valve assembly for a pressurized fluid vessel comprising:

5 a housing having a fluid inlet for connection, on filling, to a source of pressured fluid and a fluid outlet opening into the vessel, and defining a main fluid passageway therebetween;

a main valve seat defined in said main fluid passageway;

10 a main valve member movable against said valve seat to block the main fluid passageway;

means defining a secondary fluid passageway from said main fluid passageway arranged so that an upstream side of the main valve member is exposed to fluid in the secondary fluid passageway;

15 secondary valve means comprising a secondary valve opening and a secondary valve member arranged in said secondary fluid passageway movable to block the secondary fluid passageway;

20 control means responsive to a fluid level arranged to act on the secondary valve member to move this to a position on a predetermined vessel fluid level being reached in which the main valve member is exposed to a pressure differential to force the main valve member to contact the valve seat.

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2. A valve according to claim 1 in which the means defining the secondary fluid passageway include chamber-defining means defining an internal chamber within the interior of the housing within which the upstream side of the main valve member is disposed.
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3. A valve assembly according to claim 2 wherein the chamber defining means defines an opening from the main fluid passageway into the internal chamber which is closed by the secondary valve, said control means opening said secondary valve to expose the upstream side of the main valve member to pressured fluid on the predetermined vessel fluid level being reached.
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4. A valve assembly according to claim 3 wherein the chamber-defining means comprises a hollow body defining a lower cavity region within which the main valve member is slidingly received and an upper cavity region in which the secondary valve member is disposed.
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5. A valve assembly according to claim 4 wherein the exterior of said hollow body defines with an interior surface within the housing said main fluid passageway.
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6. A valve assembly according to claim 5 wherein the hollow body comprises an insert disposed within the housing and spaced from the interior surface by a plurality of ribs.

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7. A valve assembly according to claim 2 wherein the valve member is generally in the form of an upturned cup having an upper face disposed within the chamber-defining member and exposed to pressurized fluid on opening of the secondary valve, and a depending skirt at least a lower region of which protrudes from the chamber-defining member into the main fluid passageway in the closed position.

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8. A valve assembly according to claim 7 wherein the control means comprises a control pin having an end region protruding from the valve assembly, in use acted on by float means, and an opposite end region to which said secondary valve member is connected.

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9. A valve assembly according to claim 8 wherein a return spring is provided to urge the main valve member into the open position spaced from the main valve seat.

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10. A valve assembly according to claim 9 wherein the

return spring is arranged between an underside of the upper region of the main valve member and a spring seat provided on the control pin.

- 5 11. A valve assembly according to claim 3 wherein said opening of the secondary valve is disposed at an upper region of the chamber-defining means directly facing said housing inlet, and wherein the secondary valve member is disposed within the opening to be
10 movable in the upstream direction, whereby the force of infilling pressurized fluid forces the secondary valve member into the opening.
- 15 12. A valve assembly according to claim 1 further comprising a float member supported on the valve assembly and having an actuating surface which acts on the control means.
- 20 13. A valve assembly according to claim 12 wherein the float member is of elongate form disposed in a vertical orientation and mounted to allow vertical displacement.
- 25 14. A valve assembly according to claim 12 wherein the float member is of elongate form and is mounted on a pivoting arm so as to pivot between a generally

vertical orientation in an empty condition of the vessel and a horizontal or inclined orientation in a full condition of the vessel, the pivoting arm having an actuating surface which engages the control means on filling.

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15. A valve assembly according to claim 2 wherein the secondary fluid passageway is further defined extending from said internal chamber to a fluid outlet opening into the vessel, said secondary valve means being disposed in said secondary fluid passage between the internal chamber and the fluid outlet so as to block said secondary fluid passageway on the control means responding to said predetermined vessel fluid level.

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16. A valve assembly according to claim 15 wherein the secondary fluid passageway is in part defined in a conduit connected to or formed integrally with said main valve member.

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17. A valve assembly according to claim 15 wherein the secondary fluid passageway is defined in a conduit arranged fixed within the housing, the main valve member having an opening therein through which the conduit extends, whereby the main valve member is

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slidable over the conduit.

5 18. A valve assembly according to claim 16 where the said conduit extends to a secondary exit chamber from which fluid exits the assembly via one or more further ports.

10 19. A valve assembly according to claim 16 wherein the secondary valve means comprises a needle valve having a needle-like member supported on the control means which is receivable within a valve seat within said conduit.

15 20. A valve assembly according to claim 15 wherein the chamber-defining means comprises an inverted cup-like hollow body defining an opening in the upper surface facing into said main fluid passageway.

20 21. A valve assembly according to claim 20 wherein the main valve member comprises a cup-like member slidably disposed within the mouth of the inverted cup-like body with a lower periphery extending into said main fluid passageway and abutting the valve seat in the closed position.

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22. A valve assembly according to claim 16 wherein the

said secondary valve openings are defined in said conduit and wherein the movable secondary valve member comprises a sleeve which overlies said conduit and is acted on or connected to said control means to obscure said secondary valve openings.

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23. A valve assembly according to claim 21 wherein a return spring is provided between an underside of the main valve member and a spring seat within the housing, urging the main valve to the open position.

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24. A valve assembly according to claim 1 wherein the control means comprises a secondary valve support member which carries secondary valve member, the support member being slidably mounted near a lower end of the housing and to which is connected float means which urges the valve support member upwardly as the vessel fluid level rises, the secondary valve support member being downwardly biased by further spring means.

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25. A valve assembly according to claim 2 wherein said chamber-defining means defines an enclosure having an upper portion of reduced lateral dimension defining an opening into the main fluid passageway and below this a portion of enlarged lateral dimension within

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which the main valve member is disposed.

5 26. A valve assembly according to claim 25 wherein said secondary flow path is further defined within a conduit which extends from said upper portion and which includes an outlet or outlets adjacent the upper side of the main valve members.

10 27. A valve assembly according to claim 26 wherein said conduit extends through the valve member and is joined thereto or formed unitarily therewith.

15 28. A valve assembly according to claim 27 wherein the valve member has a depending skirt portion abuts the valve seat in the closed position.

20 29. A valve assembly according to claim 26 wherein said conduit is fixed within the housing, the valve member defining an opening through which the conduit extends, whereby the main valve member is slidable over the conduit.

25 30. A valve assembly according to claim 26 where the upper end of the conduit is formed with screw means for screwing into a complementary female screw thread within said upper portion.

31. A valve assembly for a pressurized fluid vessel comprising:

5 a housing having a fluid inlet for connection, on filling, to a source of pressured fluid and a fluid outlet opening into the vessel, and defining a main fluid passageway therebetween;

 a main valve seat defined in said main fluid passageway;

10 a main valve member movable against said valve seat to block the main fluid passageway;

 means defining a secondary fluid passageway from said main fluid passageway arranged so that an upstream side of the main valve member is exposed to
15 fluid in the secondary fluid passageway;

 secondary valve means comprising a secondary valve seat and a secondary valve member arranged in said secondary fluid passageway movable to block the secondary fluid passageway;

20 control means responsive to a fluid level arranged to act on the secondary valve member to block the secondary fluid passageway on a predetermined vessel fluid level being reached to thereby expose the main valve member to a pressure
25 differential forcing it against the valve seat.

32. A valve assembly according to claim 31 wherein the said means defining the secondary fluid passageway includes a body defining an opening therein communicating with said main passageway and further defining with said main valve member or with means connected to said main valve member an internal chamber.
33. A valve assembly according to claim 32 wherein the said body defining the opening therein has the form of an inverted cup, with said main valve member having a cup-like form with an upper edge slidably received within said body.
34. A valve assembly according to claim 33 wherein a conduit depends from said main valve member communicating with said internal chamber and constituting part of said second passageway.
35. A valve assembly according to claim 34 wherein the conduit has at least one opening at a lower region thereof constituting said secondary valve opening.
36. A valve assembly according to claim 35 wherein the control means includes a sleeve portion which overlies the lower region of the conduit and is

movable to block said opening or openings.

5 37. A valve assembly according to claim 31 wherein a return spring is provided to urge the main valve member out of the main valve seat.

10 38. A valve assembly according to claim 36 wherein the control means comprises a connecting rod connected to the sleeve portion, and in use acted on by float means.

15 39. A valve assembly according to claim 36 wherein a small clearance is provided between the sleeve portion and conduit whereby a small amount of fluid leakage is allowed to occur therebetween.

40. A valve assembly according to claim 38 wherein the connecting rod comprises a hollow tube.

20 41. A valve assembly according to claim 36 wherein a sealing ring is provided about the conduit above the said opening or openings against which an end of the sleeve abuts when the main valve is closed.

25 42. A valve assembly according to claim 39 wherein resilient means are provided against which an

adaptation on the conduit bears when the valve is in the closed position, providing an upward force on the sleeve to force it tightly against the sealing ring.